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10/658,079	09/09/2003	Juzer Jangbarwala	434830-002	1434
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THOMPSON HINE L.L.P. 2000 COURTHOUSE PLAZA , N.E. 10 WEST SECOND STREET DAYTON, OH 45402			ZHENG, LOIS L	
			ART UNIT	PAPER NUMBER
			1742	

DATE MAILED: 04/21/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

# Office Action Summary

Application No.

10/658,079

Applicant(s)

JANGBARWALA, JUZER

Examiner

Lois Zheng

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

## Status

- 1) ☒ Responsive to communication(s) filed on 02 February 2005.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

## Disposition of Claims

- 4) ☒ Claim(s) 1,3-26 and 29-31 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1,3-26 and 29-31 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

## Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

## Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

## Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date 6 February 2004.
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_\_.

## DETAILED ACTION

### *Status of Claims*

1. Claims 2, 27 and 28 are canceled in view of the amendment filed on 2 February 2005.

Claims 1, 3-26 and 29-31 are currently under examination.

2. The indicated allowability of claims 2-4, 6-22 and 25-26 is withdrawn in view of the newly discovered reference(s) to Parmentier et al US 6,383,972. Rejections based on the newly cited reference(s) follow.

### ***Claim Rejections - 35 USC § 103***

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. Claims 1, 3-11, 17, 22-26 and 29-30 are rejected under 35 U.S.C. 103(a) as being unpatentable over Abe US 6,641,795 B2(Abe) in view of Puskas et al. US 4,415,479(Puskas).

Abe teaches <sup>a</sup> method to electrically heating a catalyst unit comprising a catalyst on a support that is electrically heatable(abstract). The catalyst is used in reformer reactions such as steam reforming reactions using methanol(col. 5 line 18 – col. 6 line 12).

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However, Abe does not explicitly teach the claimed catalyst being conductive graphite, carbon nanotubes, activated carbon granules or carbonaceous adsorbents as recited in instant amended claim 1.

Puskas teaches a catalyst comprising palladium adsorbed on the surface of a porous carbonaceous support material such as activated carbon granules(col. 5 lines 47-56, claim 1).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have incorporated the activated carbon granules of Puskas as the catalyst support in the electrically heatable catalyst unit of Abe in order to produce a catalyst with increase catalytic activity and selectivity as taught by Puskas (col. 1 lines 29-43).

With respect to claims 1 and 29-30 of the instant invention, Abe in view of Puskas disclose a catalyst supported by activated carbon granules that is electrically heatable. The catalyst of Abe in view of Puskas can be used in chemical reactions such as a steam reforming reaction. Therefore, Abe in view of Puskas meet the intended use of "for conducting a chemical reaction in the presence of a catalyst" as recited in instant claim 1. Furthermore, since the electrically heatable catalyst unit is being used in a chemical reaction, the claim limitation of having sufficient energy to activate the catalyst, as recited in instant claim 30, is inherently met in order for the catalyst unit to function successfully in a chemical reaction.

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With respect to claim 3, 5-7 and 22 of the instant invention, Abe further teaches the catalyst may be Pd, Pt, Co, Ni, etc. The metal catalyst is loaded on a heat-resistant oxide such as  $\text{Al}_2\text{O}_3$ ,  $\text{SiO}_2$ ,  $\text{TiO}_2$ ,  $\text{ZrO}_2$ ,  $\text{MgO}$ , etc.(col. 12 lines 28-67).

With respect to claims 4, 17 and 25 of the instant invention, since the instant claims all depend on the independent claim 1, the examiner is taking the position that the activated carbon granules as catalyst support as taught by Abe in view of Puskas encompasses the claimed carbon fiber and the woven or nonwoven carbon fiber cloth or felt or plug. Therefore, a prima facie case of obviousness exists. See MPEP 2144.05. The selection of claimed carbon fiber, the woven or nonwoven carbon fiber cloth or felt or plug from the activated carbon granules disclosed by Abe in view of Puskas would have been obvious to one of ordinary skill in the art since Abe in view of Puskas teach the same utility in their activated carbon granules.

With respect to claims 8 and 9 of the instant invention, Abe further teaches that the surface area of the catalyst carrier is in the range of  $5 - 300 \text{ m}^2/\text{g}$ (col. 12 lines 47-61), which reads on the claimed surface area of about  $1 - 1000 \text{ m}^2/\text{g}$  as recited in instant claim 9. Abe further teaches that a heater unit containing sintered  $\text{ZnO}_2$  carried catalyst(col. 6, line 61 – col. 7 line 20). Even though Abe in view of Puskas do not explicitly teach the claimed carrier pore diameter of about 1 to about 100Angstroms as recited in instant claim 8, the catalyst carrier of Abe in view of Puskas inherently meets the claimed pore size since Abe in view of Puskas teach the same catalyst carrier with the same surface area as claimed.

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With respect to claims 10-11 and 26 of the instant invention, Abe further teaches that the catalyst unit having electrodes on each side of the catalyst unit(col. 9 lines 21-33). Therefore, the activated carbon granule supported catalyst in a catalyst unit between two electrodes as taught by Abe in view of Puskas meets the limitations of instant claims 10-11 and 26.

With respect to claim 23 of the instant invention, Abe further discloses that the steam reforming reaction temperature is 500°C(col. 5 line 67), which inherently meets the claim limitation of electrically heating up the catalyst for about 50 – 1200 degree C, since the catalyst would also needed to be heat up to the reaction temperature.

With respect to claim 24 of the instant invention, Abe further teaches the claimed steam reforming reaction using methanol(col. 5 line 18 – col. 6 lines 12).

5. Claims 4 and 12-18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Abe in view of Puskas, and further in view of Parmentier et al. US 6,383,972 B1 (Parmentier).

The teachings of Abe and Puskas are discussed in paragraph 4 above.

However, Abe in view of Puskas do not explicitly teach the claimed catalyst support being carbon fiber or woven/unwoven carbon fiber cloth or felt.

Parmentier teaches using activated carbon fiber fabric as support for catalyst such as Pt, Pd, Ni, etc.(abstract, col. 1 line 49 – col. 2 line 53).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have used the activated carbon fiber fabric of Parmentier to support the catalyst of Abe in view of Puskas since Parmentier teaches

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that the activated carbon fabric(i.e. woven carbon fiber cloth) is a functional equivalent catalyst support for the catalyst of Abe in view of Puskas.

With respect to claims 4 and 17 of the instant invention, the activated carbon fiber fabric as taught by Abe in view of Puskas and Parmentier read on the instantly claimed carbon fiber and woven carbon fiber cloth.

With respect to claim 12 of the instant invention, Parmentier further teaches that the carbon fibers have a mean pore size of 0.3nm – 3nm with a total porosity of 30-50% (col. 2 lines 32-36). Since Abe teaches that the support total porosity of 50% or more, the catalyst support of Abe in view of Puskas and Parmentier inherently has a total porosity of 50% or more, which means that the pore size of the catalyst support of Abe in view of Puskas and Parmentier would be 3nm or more, which overlaps the claimed pore diameter of about 0.005 to about 0.2 micrometer as recited in instant claim 12. Therefore, a prima facie case of obviousness exists. The selection of the claimed pore diameter range from the pore size range of Abe in view of Puskas and Parmentier would have been obvious to one of ordinary skill in the art since Abe in view of Puskas and Parmentier teach the same utility in their disclosed pore size range.

With respect to claims 13-15 of the instant invention, since heat conductivity, electrical resistivity and dielectric constant are inherent properties of the catalyst support and Abe in view of Puskas and Parmentier disclose a significantly similar catalyst support as the instant invention(i.e. same material and overlapping pore size), one of ordinary skill in the art would have expected the properties, such as heat conductivity, electrical resistivity and dielectric constant, to be the same as claimed. Therefore, a

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prima facie case of obviousness exists. The selection of claimed heat conductivity, electrical resistivity and dielectric constant ranges from the disclosed ranges of Abe in view of Puskas and Parmentier would have been obvious to one of ordinary skill in the art since Abe in view of Puskas and Parmentier teach the same utilities in their heat conductivity, electrical resistivity and dielectric constant ranges.

With respect to claim 16 of the instant invention, since Abe in view of Puskas and Parmentier teach a support for metal catalyst loaded in a carrier that is significantly similar to that of the instant invention (i.e. same material for the support, the catalyst and the catalyst carrier, similar carrier pore size, surface area, similar support pore size and quality), the amount of catalyst present on the support would have inherently overlap the claimed amount of about 1 microgram to 10 gram per  $\text{cm}^3$ . Therefore, a prima facie case of obviousness exists. The selection of the claimed amount of catalyst in the support from the amount disclosed by Abe in view of Puskas and Parmentier would have been obvious to one of ordinary skill in the art since Abe in view of Puskas and Parmentier teach the same utility in their catalyst amount range.

With respect to claim 18 of the instant invention, Parmentier further teaches that the fabric is shaped by rolling after the catalyst has been uniformly distributed throughout the support (col. 3 lines 12-19). Therefore, it would have been obvious to one of ordinary skill in the art to have incorporated the technique rolling of the catalyst support as taught of Parmentier into the process of Abe in view of Puskas in order to impart cohesion to the shaped support as taught by Parmentier (col. 3 lines 12-19). In addition, Abe further teaches that the catalyst is disposed in the flow path of a reactant fluid



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during the reaction(col. 6 lines 4-8). Therefore, Abe in view of Puskas and Parmentier meet the limitation of instant claim 18.

6. Claims 19-21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Abe in view of Puskas, and further in view of Colbert US 6,824,755 B2(Colbert).

The teachings of Abe and Puskas are discussed in paragraph 4 above.

However, Abe in view of Puskas do not explicitly teach the claimed polymeric adsorbent such as an ion exchange resin.

Colbert teaches the using of ion exchange resin covered carbon nanotube as catalyst support(col. 13 lines 29-33).

Therefore, it would have been obvious to one of ordinary skill in the art to have incorporated the ion exchange resin covered carbon nanotube of Colbert into the process of Abe in view of Puskas at the catalyst support since Colbert's ion exchange resin covered carbon nanotube is functionally equivalent to the catalyst support of Abe in view of Puskas.

With respect to claims 19-20 of the instant invention, the ion exchange resin covered carbon nanotube catalyst support as taught by Abe in view of Puskas and Colbert read on the polymeric adsorbent catalyst support such as an ion exchange resin as recited in the instant claims.

With respect to claim 21 of the instant invention, Abe further teaches that the catalyst is used in the form of beads.

7. Claim 31 is rejected under 35 U.S.C. 103(a) as being unpatentable over Harper et al US 5,730,845(Harper) in view of Puskas.

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The teachings of Harper is discussed in the previous non-final Office Action.

However, Harper does not explicitly teach that the claimed catalyst being conductive graphite, carbon nanotubes, activated carbon granules or carbonaceous adsorbents as recited in instant amended claim 31.

Puskas teaches a catalyst comprising palladium adsorbed on the surface of a porous carbonaceous support material such as activated carbon granules(col. 5 lines 47-56, claim 1).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have incorporated the activated carbon granules of Puskas as the catalyst support in the process of Harper in order to produce a catalyst with increase catalytic activity and selectivity as taught by Puskas (col. 1 lines 29-43).

8. Claim 1, 5, 23 and 29-30 are rejected under 35 U.S.C. 103(a) as being unpatentable over Affleck et al US 4,868,841(Affleck) in view of Puskas.

Affleck teaches a directly heated ceramic catalytic support that is heat and electrically conductive(abstract).

However, Affleck does not explicitly teach that the claimed catalyst being conductive graphite, carbon nanotubes, activated carbon granules or carbonaceous adsorbents as recited in instant amended claims 1, 29 and 30.

Puskas teaches a catalyst comprising palladium adsorbed on the surface of a porous carbonaceous support material such as activated carbon granules(col. 5 lines 47-56, claim 1).

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With respect to amended claims 1 and 29-30 of the instant invention, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have incorporated the activated carbon granules of Puskas as the catalyst support for the electrical heating of catalyst as taught by Affleck in order to produce a catalyst with increase catalytic activity and selectivity as taught by Puskas (col. 1 lines 29-43).

With respect to claim 5 of the instant invention, Affleck further teaches that the desired catalyst is Pt(abstract, col. 2 lines 20-64).

With respect to claim 23 of the instant invention, Affleck further teaches that the catalyst support is heated to about 350°C by an electrical current(col. 3 lines 26-62, col. 4 lines 15-20, col. 5 lines 5-50), which read on the claimed catalyst temperature increase of about 50 – about 1200°C.

### ***Response to Arguments***

9. Applicant's arguments filed on 2 February 2005 have been considered, but are moot in view of the new grounds of rejections.

### ***Conclusion***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Lois Zheng whose telephone number is (571) 272-1248. The examiner can normally be reached on 8:30am - 5:00pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Roy King can be reached on (571) 272-1244. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

LLZ

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